Errata: Simulating Astrophysical Magnetic Fields with Smoothed Particle Magnetohydrodynamics

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A collection of mistakes and errors in my PhD thesis. At least the ones that I've spotted. If you come across others not listed, please contact me.

Chapter 2

- Equation 2.24 (induction equation) has the wrong sign on both RHS terms. The correct equation is given by 2.21.

- Equation 2.38 (dispersion relation for MHD waves) is missing a square on the first term inside the large square root brackets to the right. It should read:

$$\frac{\omega^2}{k^2} = \frac{1}{2}\left(c_{\rm s}^2 + v_{\rm A}^2\right) \pm \frac{1}{2}\left(\left(c_{\rm s}^2 + v_{\rm A}^2\right)^2 - 4 c_{\rm s}^2 v_{\rm A}^2 \frac{k_z^2}{k^2}\right)^{1/2}$$

  In this way, the maximum of the fast magnetosonic speed then reduces to $(c_{\rm s}^2 + v_{\rm A}^2)^{1/2}$, as expected.

- Equation 2.83 (derivation of SPMHD equations of motion) has a spurious dot product in the third term, and should read accordingly:

$$\begin{aligned} \partial L_a = & m_a \mathbf{v}_a \cdot \partial \mathbf{v}_a - \sum_b m_b \frac{P_b}{\Omega_b \rho_b^2} \sum_c m_c (\partial \mathbf{r}_b - \partial \mathbf{r}_c) \cdot \nabla_b W_{ab}(h_b) \\ & + \sum_b m_b \frac{B_b^2}{2\mu_0 \Omega_b \rho_b^2} \sum_c m_c (\partial \mathbf{r}_b - \partial \mathbf{r}_c) \cdot \nabla_b W_{ab}(h_b) \\ & - \sum_b m_b \frac{\mathbf{B}_b \cdot \mathbf{B}_b}{\mu_0 \Omega_b \rho_b^2} \sum_c m_c (\partial \mathbf{r}_b - \partial \mathbf{r}_c) \cdot \nabla_b W_{ab}(h_b) \\ & - \sum_b m_b \frac{\mathbf{B}_b}{\mu_0 \Omega_b \rho_b^2} \cdot \sum_c m_c (\partial \mathbf{r}_b - \partial \mathbf{r}_c) \mathbf{B}_b \cdot \nabla_b W_{ab}(h_b) \end{aligned}$$

  The subsequent equation (Equation 2.84) is written correctly.

- Equation 2.97 (thermal conductivity) has the wrong sign, as direct second derivatives in the manner of Brookshaw (1985) have positive sign out front. It should read:

$$\frac{\mathrm{d}u_a}{\mathrm{d}t} = \sum_b \frac{m_b}{\overline{\rho}_{ab}} \alpha_u v_{\mathrm{sig}}^u (u_a - u_b) \hat{\mathbf{r}}_{ab} \cdot \nabla_a W_{ab}(h_a)$$